



UNIVERSITI PUTRA MALAYSIA

**DEVELOPMENT OF TECHNOLOGY TRANSFER MODEL WITH
ENABLING PERFORMANCE FACTORS FOR THE LIBYAN
PETROLEUM INDUSTRY**

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**DEVELOPMENT OF TECHNOLOGY TRANSFER MODEL WITH
ENABLING PERFORMANCE FACTORS FOR THE LIBYAN PETROLEUM
INDUSTRY**

By

AL MABRUK S. MOHAMED

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfilment of the Requirements for the Degree of Doctor of Philosophy**

October 2010



DEDICATION

This thesis is dedicated to my wonderful parents, who have raised me to be the person I am today. You have been with me every step of the way, through good times and bad. Thank you for all the unconditional love, guidance, and support that you have always given me, helping me to succeed and instilling in me the confidence that I am capable of doing anything I put my mind to. Thank you for everything.

I also want to dedicate this thesis especially to my precious wife, my dearest daughter Jude, and my cheering son Mohamed. Without my wife help and encouragement it simply never would have been.

Final dedication goes to a friend and mentor memory, my uncle the late colonel Abdul Salam Sultan, may his soul rest in peace.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

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Supervisor: Professor Mohd Sapuan b Salit, PhD, PEng.

Faculty: Institute of Advanced Technology

Technology Transfer (TT) is increasingly being used on petroleum industry. The evaluation of TT significant indicators and their effect on TT performance for Libyan petroleum industry were investigated. The study main objective is to develop a TT model for the Libyan oil industry with performance factors.

This study defined four categories of enabling factors that could have an effect on the TT process and its results for the petroleum industry: TT support, TT infrastructure, industry learning capability, and TT environment. The resultant TT performance and the relationship between enabling and performance factor give the level of TT performance to local petroleum industry through the TT process. Realizing the study objective would require requesting the petroleum industry input through questionnaire surveys in pilot, main studies, and validated by case studies.

For the main study, 300 questionnaire surveys were distributed and 205 were collected, offering a response rate of 68 per cent. Statistical analysis techniques, including, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) were used to examine the survey data. Analysis resulted in a TT model encompassing three TT enabling factors, namely, government support, host characteristics, technology learning capability, and the resultant performance factor named TT performance.

The baseline formulation for standardization of TT measurement in the petroleum industry was undertaken using series of measurements. Case studies from three Libyan companies involved with foreign partners were applied to validate the standardization.

The study provided evidence that the UK is the leading petroleum investor in Libyan petroleum industry. However, at TT performance perspective, German and Italian corporations have the leading edge on TT petroleum projects.

TT model was created to help both researchers and practitioners to understand the TT process in petroleum industry. The model provided an evident design on main variables influenced TT issues. The structural model consisted of four factors and five paths, representing the interrelationships between the four enabling and one outcome factor. Positively, the research results empirically validated that factors referring to technology learning capability, technology characteristics, and technology support could be incorporated to evaluate the TT performance.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah.

**PEMBANGUNAN MODEL PEMINDAHAN TEKNOLOGI DENGAN
FAKTOR PRESTASI BAGI INDUSTRI PETROLEUM LIBYA**

Oleh

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Pemindahan Teknologi (PT) semakin banyak digunakan dalam industri petroleum. Penilaian petunjuk signifikan PT dan kesannya terhadap prestasi PT untuk industri petroleum Libya diselidiki. Tujuan kajian utama adalah untuk membangunkan model PT untuk industri minyak Libya dengan faktor prestasi.

Kajian ini menetapkan empat kategori faktor pendukung yang mempengaruhi proses PT dan hasilnya untuk industri petroleum: sokongan PT, infrastruktur PT, kemampuan pembelajaran industri, dan persekitaran PT. Keputusan prestasi PT dan hubungan antara pembolehan dan faktor prestasi memberikan tingkat prestasi PT untuk industri minyak tempatan melalui proses PT. Untuk mencapai objektif kajian memerlukan input industri petroleum melalui rintis borang soal selidik, kajian utama, dan pengesahan melalui kajian kes.

Untuk kajian utama, 300 tinjauan soalselidik telah diedarkan dan 205 dikumpulkan, memberikan kadar maklumbalas sebanyak 68 peratus. Teknik analisis statistik, termasuk, Analisis Faktor Tinjauan (EFA), Analisis Pengesahan Faktor (CFA) dan

Pemodelan Persamaan Struktur (SEM) digunakan untuk mengkaji data kaji selidik. Hasil analisis model PT mengandungi tiga faktor pemboleh, seperti sokongan kerajaan, ciri-ciri hos, dan kebolehan pembelajaran teknologi, manakala hasilan faktor prestasi dinamakan prestasi PT.

Rumusan asas untuk piawaian pengukuran PT dalam industri petroleum dijalankan menggunakan siri-siri pengukuran. Kajian kes daripada tiga syarikat Libya terlibat dengan rakan asing telah dilaksanakan untuk mengesahkan piawaian.

Kajian ini memberikan bukti bahawa UK adalah pelabur petroleum yang terkemuka dalam industri petroleum Libya. Namun, pada perspektif prestasi PT, Jerman dan syarikat Itali merupakan pendahulu kepada projek-projek petroleum PT.

Model PT diciptakan untuk membantu penyelidik dan pengamal untuk memahami proses PT dalam industri petroleum. Model ini memberikan rekabentuk yang nyata pada pembolehubah utama yang mempengaruhi masalah PT. Model struktur terdiri daripada empat faktor dan lima laluan, yang mewakili hubungan timbal balik antara empat pembolehan dan salah satu faktor hasil. Secara positif, hasil kajian membuktikan secara empirik bahawa faktor yang merujuk pada kemampuan teknologi pembelajaran, ciri-ciri teknologi, dan sokongan teknologi boleh digabungkan untuk menilai prestasi PT.

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had a remarkable influence on my entire career in the field of technology transfer modeling.

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The Libyan government scholarship is gratefully acknowledged.

APPROVAL SHEETS

I certify that an Examination Committee has met on **08/10/2010** to conduct the final examination of **Al Mabruk S. Mohamed** on his PhD thesis entitled "**Development of Technology Transfer Model with Performance Factors for Libyan Petroleum Industry**" in accordance with Universiti Pertanian Malaysia (HIGHER Degree) Act 1980 and Universiti Pertanian Malaysia (High Degree) Regulation 1981. The committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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DECLARATION

I declare that the thesis is my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or other institutions.

ALMABRUK S. MOHAMED

Date: 08/10/2010

TABLE OF CONTENTS

	Page
DEDICATION	ii
ABSTRACT	iii
ABSTRAK	iv
ACKNOWLEDGEMENTS	vii
APPROVAL SHEETS	ix
DECLARATION	xi
LIST OF TABLES	xvi
LIST OF FIGURES	xviii
LIST OF ABBREVIATIONS	xx
 CHAPTER	
 1 INTRODUCTION	 1
1.1 Background	1
1.2 TT Definition	4
1.3 Problem Statement	6
1.4 Research Objective	6
1.5 Scope of the Study	7
1.6 Significance of the Study	8
1.7 Research Method	9
1.7.1 Conceptual Model Development	9
1.7.2 Pilot Study	10
1.7.3 Main Study	10
1.7.4 Model Refinement and Validation	11
1.8 Thesis Layout	12
 2 LITERATURE REVIEW	 14
2.1 Introduction	14
2.2 Libyan Oil Industry	16
2.3 Critical Review of TT Existing Models	22
2.3.1 Calantone's TT Framework (1988)	23
2.3.2 Simkoko TT Model (1992)	28
2.3.3 Kumar TT Model Study (1999)	31
2.3.4 Lin and Berg TT Research Model (2001)	37
2.3.5 Malik's TT Broadcast Model (2002)	39
2.3.6 Wang TT Model (2004)	43
2.3.7 Waroonkun and Stewart TT Model Study (2008)	46
2.4 Comparative Analysis	50
2.4.1 Similarities	50
2.4.2 Differences	51



2.5	Conceptual Model for TT in Libyan Petroleum Industry	52
2.5.1	TT Support	54
2.5.2	TT Infrastructure	57
2.5.3	TT Environment	61
2.5.4	Petroleum Industry Learning Capability	68
2.5.5	TT Performance	73
2.6	Summary	77
3	METHODOLOGY	79
3.1	Introduction	79
3.2	Research Design	79
3.3	Research Method	80
3.3.1	Conceptual Model Development	82
3.3.2	Questionnaire Survey Design	82
3.3.3	Respondents Selection	83
3.3.4	Data Collection	87
3.4	Pilot Study	88
3.5	Main Study	90
3.5.1	Questionnaire	91
3.5.2	Data Screening	92
3.6	Analysis Methods	93
3.6.1	Exploratory Factor Analysis (EFA)	93
3.6.2	Structural Equation Modeling (SEM)	94
3.6.3	Goodness of Fit Indices and Measures	95
3.6.4	Standardization of TT Performance Measurement	98
3.7	Software Packages	98
3.7.1	SPSS	98
3.7.2	AMOS	99
3.8	Model Validation Process	100
3.9	Summary	100
4	RESULTS AND ANALYSIS: PILOT STUDY	101
4.1	Introduction	101
4.2	Research Approach	102
4.3	Classification of Respondents	103
4.4	Mean and Standard Deviation	113
4.5	Correlation	116
4.6	Regression	118
4.7	Questionnaire Refinement for Main Study	121
4.8	Summary	122
5	RESULTS AND ANALYSIS: MAIN STUDY	123
5.1	Introduction	123
5.2	Research Approach	124

5.2.1	Data Collection	124
5.2.2	Data Screening	126
5.3	Classification of Respondents	127
5.4	Rating of TT Variables	140
5.4.1	Analysis of Variance (ANOVA)	140
5.4.2	Mean and Standard Deviation	141
5.5	Exploratory Factor Analysis	143
5.6	Structural Equation Modeling (SEM)	145
5.6.1	Measurement Model	146
5.6.2	The Path Analysis of the Model	148
5.6.3	Respecifying the Path Model	150
5.6.4	SEM Discussion	152
5.7	Limitation of the Main Study	155
5.8	Standardization of Petroleum Industry Technology Transfer in Libya	156
5.8.1	TT Perspectives	158
5.8.2	Evaluating TT Indictors	160
5.8.3	Methods for Standardization TT Performance	163
5.8.4	Future Developments	174
5.9	Summary	175
6	CASE STUDY: MODEL VALIDATION	177
6.1	Introduction	177
6.2	Research Approach	178
6.3	TT Performance Indictors	179
6.4	Case Studies	179
6.4.1	Project 1 –Tripoli - Mellitah Pipeline	179
6.4.2	Project 2 –Sarir- Tobruk Pipeline	182
6.4.3	Project 3 – Mellitah NC 118 Development	183
6.5	Classification of Respondents	185
6.6	Mean and Standard Deviation	190
6.7	Standardizing TT Performance- Case Study	194
6.7.1	Determining Relative and Global Weight	195
6.7.2	Evaluating Technology Transfer	195
6.7.3	Company Comparative Analysis	200
6.7.4	Project Nationalities Comparative Analysis	204
6.8	Model Validation	205
6.8.1	Comparing Actual Mean Values	206
6.8.2	Determining the Predicted Scores	207
6.8.3	Comparison between the Actual and Predicted Mean Values	210
6.9	Summary	214
7	CONCLUSIONS AND DIRECTIONS FOR FUTURE WORK	216
7.1	Conclusions	216
7.1.1	Defining TT Enablers and Model Development	216
7.1.2	TT Path Model Development	217

7.1.3 Development of TT Performance Standardization Approach	218
7.2 Recommendation for Future Research	222
REFERENCES	224
APPENDICES	238
APPENDIX A: Supervisor Questionnaire Survey Cover Letter	238
APPENDIX B: Student's Attaché in the Libyan People's Bureau in Malaysia	239
APPENDIX C: Main Questionnaire Survey (English & Arabic)	240
APPENDIX D: Case Study Questionnaire Survey (English & Arabic)	251
BIODATA OF STUDENT	255
LIST OF PUBLICATIONS	257